

**Math 109 - Test 1B**  
February 13, 2020

Name \_\_\_\_\_

Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations where necessary.

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1. (4 points [3]) Which of these equations ARE linear equations? Circle all that apply.

$$\frac{x+5}{6} + 3 = \frac{x}{7}, \quad 4x = 7(2-x), \quad (3x+2)^{3/2} = 4, \quad 3x(x-8) = x$$

2. (3 points [3]) Solve for  $x$ :  $5x - 12 = 9$

3. (4 points [3]) Solve for  $y$ :  $\frac{3y-6}{-7} = 6$

4. (4 points [3]) Yesterday, David rode his bike at the speed of 15 miles per hour. Today, he rode at 12 miles per hour. In the two days, he biked for a combined total time of 7 hours. Let  $x$  be the number of hours he biked yesterday. Write an algebraic expression in terms of the single variable  $x$  that gives the total number of miles he biked in the two days. (Remember that *distance equals rate times time*.)

5. (3 points [3]) Solve for  $x$ :  $6 - 9x \geq 51$

6. (4 points [3]) Solve for  $w$ :  $6w - (7 - 2w) = 4(w - 2) + 4w + 1$

7. (3 points [3]) In a work zone on a certain highway, you cannot drive slower than 30 mph and you cannot drive faster than 45 mph. Use  $x$  to represent speed (in mph), and write an inequality that describes the speeds you can drive.

8. (5 points [3]) Solve for  $y$ . Write your solution set in interval notation, and graph it on a number line.

$$8y + 14 \leq 2(3 + 2y) + 7y$$

9. (4 points [3]) Solve for  $x$ :  $5x + 9 > \frac{5}{2}(4 + 2x)$

10. (6 points [3]) Solve for  $y$ . Write your solution set in interval notation, and graph it on a number line.

$$3(y - 4) + 2y < 3 \quad \text{and} \quad 7 - 2y \leq 13$$

11. (3 points [3]) Kate Jindo sells her famous, craft hot sauce for \$9 per bottle. Let  $b$  represent the number of bottles that Kate will sell at the farmer's market. Kate would like to make at least \$400. Write an inequality involving  $b$  that Kate could solve to determine the numbers of bottles she must sell.

12. (4 points [7]) Solve for  $x$ :  $3(8x - 3)(x + 6) = 0$

13. (4 points [1,9]) Determine the values of  $x$  that are restricted from the following expression:  $\frac{x - 9}{x^2 + 4x - 21}$

14. (4 points [1,3,9]) Solve for  $y$ :  $\frac{5}{y - 4} = \frac{8}{y}$

15. (4 points [1,3,9]) Solve for  $x$ :  $7 - \frac{4}{x + 4} = \frac{x}{x + 4}$

16. (5 points [7]) Solve for  $t$ :  $t^2 + 2t - 13 = 2$

17. (4 points [9]) Solve for  $u$ :  $13 + \sqrt{5u + 1} = 4$

18. (5 points [9]) Solve for  $x$ . Round your final answer(s) to the nearest hundredth.

$$\sqrt[3]{2x + 5} - 3 = 0$$

19. (6 points [7]) Solve for  $x$ . Write your final answer(s) in decimal form, rounded to the nearest hundredth.

$$2x^2 - 3x - 1 = 0$$

20. (3 points [9]) The following equation is “quadratic in form.” In order to solve it, what substitution would be most helpful? (Do not solve the equation.)

$$(x^3 + 1)^2 + 3(x^3 + 1) + 2 = 0$$

21. (4 points [9]) Solve for  $v$ :  $(3v - 7)^{1/5} - 1 = 1$

22. (4 points [9]) Solve for  $x$ . Round your answer(s) to the nearest hundredth.

$$(x - 2)^3 + 15 = 3$$

23. (10 points [3,7,9]) Solve for  $x$ :  $\frac{6}{(x - 1)(x - 3)} = 1 + \frac{3}{x - 3}$